

FINDINGS AND ANALYSIS

DRUM MINE

M/027/007

September 11, 1997

SUMMARY

The Drum Mine currently is permitted by two operators, Western States Minerals Corporation (WSMC) and Jumbo Mining Company (JUMBO). In July, 1989, portions of the permit area held by WSMC were transferred to JUMBO. This Findings and Analysis is presented as a matter of process as provided for under R647-4-102, Duration of the Notice of Intention, to determine whether the exiting Notice of Intentions for the Drum Mine meet the surety requirements and performance standards of the R647 Non-Coal Rules.

The conditions of partial permit transfer, dated July 25, 1989, clearly show that issues pertaining to reclamation responsibility were not completely resolved at the time of transfer. Moreover, ensuing events have undermined the assumptions of the reclamation plan.

Subsequent to partial transfer of the permit, the Division of Water Quality ordered cessation of the active leach pads in 1990. Cessation of the leaching operations left the leach pads inoperable and with no adequate closure plan for the leach pads during reclamation.

Applications to revise the plans by installing additional heap leach pads were found inadequate by the Division and indicated that numerous deficiencies pertaining to information found in the existing plan would need to be corrected prior to approval. Resolutions to inadequacies found in the plans for both WSMC and JUMBO have not been forthcoming since the partial permit transfer in 1989.

Review of the Notice of Intent by WSMC and the Notice of Intent by JUMBO found that the mining and reclamation plans for both operators were inadequate to clearly segregate the two permitted areas. Although the partial permit transfer indicated that certain features and facilities within the site were specific to WSMC or specific to JUMBO, neither plan accurately delineates these features as they currently exist nor demonstrate that reclamation can be accomplished within those specified areas.

Evaluation of the Drum Mine considers reclamation costs and treatments for the entire site. Assumptions made by the Division to ensure that adequate bond is available necessitate that the collective areas of both permits be used to achieve reclamation. Regrading of heaps and waste dumps and the utilization of available borrow materials for adequate cover and soil requirements to meet reclamation standards clearly indicate that areas currently delineated in either permit would have to overlap each other to achieve reclamation.

The revised bond amount as determined in this review is significantly higher than previous bond amount estimates. This increase in the bond amount is due to several factors, including but not limited to: adding costs associated with detoxification of the cyanide heap leach pads to the bond costs; having a disturbed area significantly larger than was previously assumed; finding that the volume of materials (ore and waste) mine is greater than was proposed in the original operation plan; site conditions such that the cyanide heap leach pads cannot be flushed and neutralized as proposed in the plan due to restrictions on operations as ordered by the Division of Water Quality; providing alternate plans to cap or relocate the leached ore require significant increases in earthmoving requirements; and, the lack of a clear and concise reclamation plan calls for conservative estimation of the reclamation treatments necessary to assure that the amount of surety required for the operations is adequate.

Two scenarios were used in evaluation of the bond amount. SCENARIO A assumes that the leached ore will be relocated to the mine pit areas for disposal. SCENARIO B assumes that the leach pads can be adequately capped or covered in place during reclamation. Both scenarios assume that detoxification of the leached ore will be necessary to achieve reclamation.

The reclamation bond cost estimates for the two alternative plans are as follows:

SCENARIO A	\$8,231,000
SCENARIO B	\$2,674,000

To date, it is the opinion of the Division, that WSMC and JUMBO have failed to adequately address the requirements of the R647 rules, and are currently inadequately bonded for the surface disturbance and existing conditions at the Drum Mine site.

The Division has evaluated and concluded that the aggregate bond amount required for the Drum Mine site must be increased to \$2,674,000 as provided in SCENARIO B of the bond estimate. Based on the parameters used in estimating the surety amount, the Division finds that each operator should increase their respective bond amount to \$1,337,000.00.

Any further adjustment to the bond estimates shown above will require that specific and concise reclamation plans be submitted to the Division for review and approval. Analysis and evaluation of the existing site conditions must be accomplished by the operators to verify and develop a workable reclamation plan. Once a revised reclamation plan is provided which meets the requirements of the Minerals Program, the Bureau of Land Management, and the Division of Water Quality, the bond amount would be re-evaluated and adjusted to reflect an approved plan.

ANALYSIS AND FINDINGS OF PERMIT DEFICIENCY**R647-4-105 - Maps, Drawings and Photographs****Findings:**

As provided for under R647-4-102, and in accordance with the requirements of R647-4-105, each operator, shall at a minimum, provide a reclamation activities and treatment map to identify the location and the extent of the reclamation work to be accomplished by the operator upon cessation of mining operations. This drawing shall be utilized to determine adequate bonding and reclamation practices for the site.

Analysis:

No suitable designs or drawings exist with the plans to demonstrate that the site can adequately be reclaimed. No approved closure plans for the heap leach pads exist to determine the extent of the work required to conduct reclamation. Without adequate maps and plans delineating the location and the extent of the mining and reclamation activities to be conducted within each permit area, numerous assumptions were required by the Division to determine the surety requirements for the site.

R647-4-110 - Reclamation Plan**Findings:**

As provided for under R647-4-102, and in accordance with the requirements of R647-4-110, the existing mining and reclamation plans fail to suitably demonstrate that reclamation can be accomplished on the Drum Mine site. At a minimum, the plans must be provided to include maps or drawings as necessary and consist of a narrative description of the proposed reclamation. All applicable requirements under this section of the regulations must be adequately addressed. Specifically, a description of the treatment, location and disposition of any deleterious or acid-forming materials generated and left on-site, including a map showing the location of such materials upon the completion of reclamation. The plans must be clear and concise and demonstrate that the proposed reclamation treatments can be achieved.

Analysis:

The existing reclamation plans do not incorporate an adequate closure plan for the cyanide heaps. Such a closure plan must be incorporated into the plans for review and approval by the Division, DWQ, and the BLM.

The plans need to address the location, characterization and amount of suitable cover and

soil materials within the permit area. Mass balance calculations need to be developed for regrading the waste dumps, heaps and other disturbed areas in a manner compatible with the postmining land use.

All reclamation treatments necessary to accomplish reclamation must be presented in the plans. Plans must be included to demonstrate that suitable detoxification of all contaminated materials will occur. Analysis of the existing conditions must be presented in the plans to support the proposed reclamation treatments.

The plans must include tonnages/volumes of ore and waste materials generated and their respective location and disposition.

Quantities, equipment selection, productivity, and unit cost information must be developed in the reclamation plans to support the reclamation treatments proposed as a basis for determination of the reclamation costs.

R647-4-111 - Reclamation Practices

Findings:

As provided for under R647-4-102, and in accordance with the requirements of R647-4-111, the existing mining and reclamation plans fail to demonstrate that the reclamation practices and standards required under this section of the regulations will be met. The plans must be revised to demonstrate that these reclamation standards are being met. In the event that such standards cannot be met, the plans must clearly indicate so and specifically request a variance from the reclamation standards as allowed for under R647-4-112 of the Non-Coal Rules.

Analysis:

The plans needs to clearly indicate how the operation will comply with the reclamation practices as detailed in the Non-Coal Rules. Additionally, any specific permit conditions, stipulations or requirements by other state and federal agencies must be addressed in the plan. These conditions include those restrictions and conditions placed on the permit by the BLM and DWQ.

The plans need to address pit highwalls, the reduction of the slopes of the dumps and heaps to 3:1, the identification and location of all structures, facilities, roads and other features to be removed or retained following reclamation.

The plan needs to specifically outline and quantify all reclamation treatments to be used during reclamation activities, including, but not limited to: demolition and removal, elimination of trash and debris, treatments for hazardous or unsuitable materials, soil replacement, vegetation

treatment, drainage and erosion control, and the re-establishment of natural drainages through the permit area as part of reclamation.

R647-4-113 - Surety

Findings:

As provided for under R647-4-102, and in accordance with the requirements of R647-4-113, the Division finds that the current amount of reclamation surety posted is inadequate. The Division shall require an increase in the reclamation surety to an aggregate amount of \$2,674,000.00 for the Drum Mine site. Respectively, WSMC shall be required to increase their reclamation surety amount to \$1,337,000.00 and JUMBO shall be required to increase their reclamation surety amount to \$1,337,000.00.

Analysis:

Determination of the bond amount for the Drum Mine requires several assumptions due to the lack of site specific information regarding reclamation of the facilities. It is important to note that the assumptions made in determination of the bond amount are preliminary (pre-design) in nature and do not assure that their application will comply with all the requirements of the Division, DEQ/DWQ, BLM, or other agencies' requirements. The intent of these assumptions (having failed to provide an approvable reclamation plan) is to apply a feasible scenario to achieve reclamation and to determine an appropriate bond amount to assure that reclamation can successfully be achieved. Assumptions made in determination of the bond amount are listed hereunder.

Evaluation of the Drum Mine considers reclamation costs and treatments for the entire site. Deficiencies in the operation and reclamation plans for both operators as explained in these analyses and assumptions made by the Division to estimate the bond amount necessitate that the collective areas of both permits be used to achieve reclamation. Regrading of heaps and waste dumps and the utilization of available borrow materials for adequate cover and soil requirements to meet reclamation standards clearly indicate that areas currently delineated in either permit would have to overlap each other to achieve reclamation.

The location and extent of the mining operations was determined using aerial photography and mapping information obtained from photography taken by Olympus Aerial Surveys on July 22, 1987. While both Western States Minerals Corporation (Western) and Jumbo Mining Company (Jumbo) both contend that little changes to the overall surface area have occurred since the date of the photography, the Division has been unable to obtain updated or current maps and plans showing existing conditions.

The amount of ore and waste materials removed and placed in heaps and dumps during the course of mining operations is also unclear in the operation plan. Ore was segregated into

two types, high and low grade. Volumes of ore were estimated based on the July 22, 1987 drawings and are provided in the bonding calculations. All of the high and low grade leach pads have been leached to some extent with the exception of LG-1, which was found to be below the elevation of the recovery ponds. The volume of LG-1 is estimated at about 53,000 cubic yards of material. This material was planned to be relocated at a later date to allow leaching. The total volume of ore material was estimated from the drawings as 2,269,000 cubic yards and the volume of waste material as 1,837,000 cubic yards.

Detoxification of the cyanide heap leaches prior to reclamation activities is indicated in the plan but has not been accomplished to date. The estimated costs associated with detoxification are included in this revised bond amount.¹

The specific methodologies involved in detoxification of the heaps has not been well established in the plan but it was previously assumed that by flushing of the heaps with water, carbon dioxide absorbed in the water will reduce the pH of the solutions to approximately 8.0-8.5 and that oxidation of the cyanide concentrations will also occur by flushing the heaps. Effluent criteria for neutralization of the cyanide will most likely be based on 0.2 mg/l weak acid dissociable (WAD) cyanide, unless required otherwise by other federal or state limitations. Flushing of the heaps normally occurs immediately following the leaching process, but has not been the case for

¹ On August 14, 1990 BLM issued a Modification of Bonding Policy for Plans of Operation Authorized by 43 CFR Part 3809. This modification requires operators who use "cyanide/other leachates" to post a bond equal to 100 percent of estimated closure costs. The bonding policy modification was applicable to leach heaps, pads, and cyanide-bearing tailings impoundments and ponds, but did not apply to vat leach facilities using cyanide.

BLM policy requires bonds for the full cost of reclamation, including heap and solution detoxification and neutralization to State and Federal standards, for all cyanide operations on Federal lands. BLM requires that cyanide solutions and heaps be neutralized or detoxified prior to solution release to the environment. Neutralization of cyanide solutions is also required for any prolonged period of inactivity and for temporary or final closure. Specific concentrations for neutralization or detoxification levels are not specified in BLM policy. Heaps must be neutralized upon completion of each heap. Flushing alternatives may be used, but heap materials and/or discharges must meet the appropriate state and EPA discharge limits. The conditions necessary for release of bond were not addressed in the BLM policy.

Monitoring of groundwater and surface water through closure and final reclamation is required. Specific monitoring requirements such as the frequency, location, chemical parameters, and analytical methods were not outlined in the policy and are left to the discretion of the state and BLM district offices. Additional details on detoxification, closure, and reclamation of cyanide operations are not addressed in the BLM policy.

In 1992, BLM issued its Solid Minerals Reclamation Handbook with guidance on reclamation of mining sites on Federal and Indian lands (BLM 1992). The manual specifically addresses cyanide heap and vat leach systems and provides general reclamation guidance and approaches. According to the BLM, the mine reclamation plan should cover cyanide detoxification of residual process solutions, ore heaps, tailings impoundments, and processing components. BLM strongly encourages laboratory and pilot test studies of selected/proposed detoxification. Concurrent reclamation during active mining also is recommended. In the Handbook, BLM does not require any specific metal or cyanide concentrations that must be achieved. Criteria are established on a site-specific basis reflecting any special concerns of the area. The Handbook is written as a general "how to" manual as opposed to setting specific requirements of procedures that must be followed. It discusses the various methods of treatment available (hydrogen peroxide, natural degradation with fresh water rinse, alkaline chlorination, etc.) and outlines the various phases of reclamation (treatment of cyanide solutions, disposal of treated solutions, spent heap and tailings, shaping and revegetation, surface water diversions, process ponds, and liner disposal).

BLM recommends allowing an extended period of time, six months or more, between cessation of neutralization and evaluation of effluent when determining the success of neutralization or detoxification. The extended period should cover a spring run-off or substantial precipitation event. Once this has been done, surface reclamation can begin. (BLM 1992)

these operations.

The state Department of Environment Quality (DEQ), Division of Water Quality (DWQ) ordered cessation of leaching operations for the site in July, 1990. Under these constraints, flushing of the leach pads for detoxification cannot occur as proposed in the plan. Evaluation of the existing conditions will be required in order to determine an acceptable method for neutralizing the cyanide heaps or preventing contamination from them. Until such time as a site characterization and evaluation of the heaps is accomplished, the specific methodology for mitigation and reclamation of the heaps cannot be determined. The reclamation cost estimate provides for a lump sum cost for the evaluation and treatments which may be necessary for reclamation but cannot be included in detail at this time.

For the purposes of evaluation of the bond amount required, two scenarios were evaluated. SCENARIO A - Relocation of all leached heaps to the pit areas for final reclamation, and, SCENARIO B - Regrading and capping of all leached heaps in existing locations.

SCENARIO A has the advantage of physically removing the leached ore from the pads and placing the materials in the pits. By removing the ore to the pad liners, any perched water held by the leach pads can be decanted and treated during the removal process. However the methods used to accomplish this have not been determined at this time and cannot be determined without a complete evaluation of all the heaps as they currently exist. Placing the ore back into the pit also eliminates the hazards associated with the pit operations and allows for regrading and revegetation of most of the pit areas. This scenario was discussed with the BLM and DWQ and was considered as the preferred alternative for reclamation.

SCENARIO B assumes that a method can be employed to either neutralize or eliminate the perched water beneath the heap pads. However the methods used to accomplish this have not been determined at this time and cannot be determined without a complete evaluation of all the heaps as they currently exist. Following treatment of the perched water beneath the pads, capping would be accomplished over all leached heaps to prevent any further contamination of surface or groundwater. This scenario leaves most of the pit areas as they currently exist and also unvegetated.

Under the assumptions of either SCENARIO A or SCENARIO B, the most significant costs involved in determination of the bond amount involve earthmoving activities. Because specific reclamation treatments for much of the reclamation work required have not and cannot be determined until such time as a detailed reclamation plan is provided, the evaluation and the determination of the bond amount has not included such specificity or detail in the cost estimate. Providing estimated costs of such incidental reclamation activities like fences, vegetation sampling, mobilization and demobilization costs, silt fencing, riprap, channel construction and other reclamation treatments would appear to only add a small percentage to the total bond estimate. For the purposes of these analyses, costs for such treatments are not detailed in the surety amount estimate. However, once a concise reclamation plan is developed, a more detailed

reclamation costs estimate would be accomplished, reflecting those treatments.

Reclamation of the pads would include a reduction of the out slopes of the pads, from the angle of repose of the material, to a slope of approximately 3:1 as recommended by the Division and as indicated in the plan. Grading of the waste dump slopes will also be required under the same assumptions. Consequently, the extent of the dumps and heaps will increase during regrading. Areas projected in the cost estimation allow for the increase in the acreages for the dumps and heaps. Covering and regrading the heaps may also necessitate extending the liners to isolate the ore. Dozer-assisted scrapers were used in the cost estimate because of the average haul distances and the tonnages involved in the cost estimates. This equipment was used only to simplify the earthmoving cost estimation. More likely, a detailed reclamation plan would require a combination of dozer, scraper, loader, and truck type equipment to accomplish reclamation.

The total permit area is based on the area enclosed within the fence shown on the drawings made by Olympus Aerial Surveys in 1987 and was measured as 344 acres. The total current disturbed area for the operations is estimated at 250 acres based on the aerial photographs of the site and projecting those areas onto the drawings. This 250 acres does include some areas within the disturbed area boundary which are currently undisturbed, but much of this area will be disturbed as part of the reclamation operations. These undisturbed in-holdings within the disturbed area boundary will need to be used as source materials for suitable cover and soils materials for reclamation of the pads and dumps.

In addition to the area indicated as the currently disturbed area, additional areas will most likely need to be disturbed as a source for borrow materials for soil and cover materials. While many of the undisturbed areas along the perimeter of the site are too steep and unsuitable for borrow material, the area located in the northwest corner of the site appears suitable. The extent of this borrow area is estimated as approximately 23 acres. Not all materials necessary for use as cover and soil materials can be derived from this single borrow area. The utilization of other suitable soil and cover material from within the existing disturbed area boundary is essential in accomplishing reclamation.

Determination of the amount and depth of the cover and soils materials required over the heaps and dumps on the site has not been developed in the existing reclamation plan. In order to determine the costs associated with these activities, the following assumptions were made.

Capping of the heaps following detoxification is considered as part of the reclamation requirements. A typical capping scenario would be to provide for six inches of clay over the heap, followed by 1.5 feet of rock or other suitable neutral material, and a final covering of one foot of suitable growth material for revegetation. Because of the arid climate, application of the clay material may not be required for covering the heaps, but because of the porosity of the ore, suitable materials must cover the ore to allow for moisture retention and root penetration. Consequently, the clay and rock cap could be replaced with two feet of suitable neutral material as cover for moisture retention and root penetration, followed by an additional foot of suitable

growth material. In either case, the amount of 'cover' material placed over the ore heaps would be two feet of material. For the bonding purposes, two feet of 'cover' material and an additional one foot of 'soil' (see below) material over the ore heaps will be used in estimating the costs.

Waste dumps, due to the coarse waste rock, have similar problems relating to moisture retention and root penetration. However, in the process of regrading the waste dumps, selected materials within the dumps themselves can be used to allow for finer materials to remain near the dump surfaces. This assumption precludes the necessity for applying two feet of cover material on the waste dumps. One foot of suitable growth material must however be applied to the surfaces of the dumps to satisfactorily achieve revegetation.

Suitable growth materials are to be used in as much as sufficient topsoil materials are not available within the permit area. Selected materials will have to be used from within the site to provide sufficient materials for suitable growth medium. Therefore, suitable growth material shall mean such topsoil, subsoil and other soil materials found within the site which are capable of supporting plant growth. The cost estimate shall refer to this material as 'soil' material.

Revegetation of the site will be accomplished following reclamation standards as presented in the plan and approved by the Division. The cost basis for revegetation will be by application of seed, mulch and fertilizer by hydro or air seeding methods. The total area requiring revegetation varies based on the scenario used. SCENARIO A includes revegetation of the pit areas covered and capped within the pit during backfilling. The total disturbed area requiring revegetation for this alternative including the proposed borrow area is approximately 270 acres, leaving approximately 5 acres un-revegetated. SCENARIO B will not include portions of the pit areas, but would include the borrow area, requiring revegetation of an estimated at 245 acres, leaving approximately 30 acres un-revegetated.

Unit cost information used in the determination of the bond amount is taken from R. S. Means, 1997 Heavy Construction Cost Data, 11th Annual Edition. The 30 City Average Cost Index was used in selecting unit cost information for each activity. The Means Historical Cost Index was used to project escalation costs.

Determination of Surety Amount			Last Revised	Sep 11, 1997
Drum Mine		M/023/007	Juab County	Utah
ACTIVITY	QUANTITY	UNITS	COST/UNIT	AMOUNT
AREA AND VOLUMETRIC ESTIMATES USED IN THE BOND CALCULATIONS				
PERMIT AREA (Fence Line)	344	AC		
DISTURBED AREAS				
Plant Area	18.1	AC		
Pit No. 1	25.0	AC		
Pit No. 2	21.2	AC		
WD-1	28.1	AC		
WD-2	14.4	AC		
WD-3	7.2	AC		
WD-4 (Covered by HG-7)	n/a	AC		
WD-5	13.4	AC		
HG-1	14.0	AC		
HG-2	11.7	AC		
HG-3	8.2	AC		
HG-4	6.6	AC		
HG-5	10.9	AC		
HG-6	4.7	AC		
HG-7	10.7	AC		
LG-1	4.3	AC		
LG-2	17.8	AC		
LG-3	10.0	AC		
Roads and Other Areas	23.7	AC		
TOTAL CURRENT DISTURBED AREAS	250.0	AC		
Proposed Borrow Area	23.0	AC		
TOTAL DISTURBED AREAS	273.0	AC		

Determination of Surety Amount					Last Revised	Sep 11, 1997
Drum Mine			M/023/007		Juab County	Utah
ACTIVITY		QUANTITY		UNITS	COST/UNIT	AMOUNT
ESTIMATED HEAP VOLUMES						
Heap	Av. Toe Elev.	Av. Crest Elev.	Av. Height, FT	Toe Area, FT2	Crest Area, FT2	Volume, YD3
HG-1	5945	5980	35	275,068	204,474	311,000
HG-2	5945	5965	20	346,041	227,802	213,000
HG-3	5990	6025	35	196,394	108,526	198,000
HG-4	6000	6035	35	239,006	132,167	241,000
HG-5	5990	6015	25	324,778	176,021	232,000
HG-6	6005	6045	40	101,463	30,624	98,000
HG-7	5960	5985	25	364,434	200,517	262,000
LG-1	5910	5925	15	121,510	70,570	53,000
LG-2	6050	6090	40	303,948	97,983	298,000
LG-3	6035	6085	50	286,581	105,774	363,000
Total Heap Volume						2,269,000
ESTIMATED DUMP VOLUMES						
Waste Dump			Volume, YD3			
WD-1			549,000			
WD-2			434,000			
WD-3			65,000			
WD-4 (Covered by HG-7)			0			
WD-5			789,000			
Total Waste Dump Volumes			1,837,000			

Determination of Surety Amount			Last Revised	Sep 11, 1997	
Drum Mine		M/023/007	Juab County	Utah	
ACTIVITY	QUANTITY	UNITS	COST/UNIT	AMOUNT	
ESTIMATED PIT CAPACITIES The following volumes are the estimated capacities of the closed basin areas of the pits. This is not the entire mined volume of the pits. These volumes were used to determine the amount of materials necessary to allow the pits to drain freely and not create impoundments. These volumes were also used in evaluation of the pits as location for the disposal of leached ore into the pit areas.					
	Elevation, FT	Area, FT2	Interval, FT	Volume, YD3	Cumulative Capacity, YD3
Pit No. 1	5760	340			
	5775	5,847	15	2,000	2,000
	5800	24,365	25	14,000	16,000
	5825	53,791	25	36,000	52,000
	5850	95,472	25	69,000	121,000
	5875	177,321	25	126,000	247,000
	5900	263,750	25	204,000	451,000
	5925	371,950	25	294,000	745,000
	5950	531,097	25	418,000	1,163,000
Pit No. 2	5835	6,313			
	5850	18,470	15	7,000	7,000
	5875	75,619	25	44,000	51,000
	5900	143,652	25	102,000	153,000
	5925	247,721	25	181,000	334,000
	5950	334,497	25	270,000	604,000

Determination of Surety Amount			Last Revised	Sep 11, 1997
Drum Mine		M/023/007	Juab County	Utah
ACTIVITY	QUANTITY	UNITS	COST/UNIT	AMOUNT
SCENARIO A - Relocation of all leached heaps to the pit areas for final reclamation.				
DETOXIFICATION				
Detoxification assumes flushing of the heap areas with water to neutralize cyanide is not a viable option due the current restrictions on the leach pad operation. In order to eliminate contaminated water perched within and under the leach pad facilities, the ore will be removed down to the pad liners. Any water encountered in the ore removal process will be decanted from heaps, neutralized and disposed of by treatments necessary and approved by DEQ in developing a mitigation plan for detoxification of the leach pads. Costs include evaluation of the heaps, sampling costs, installation of monitoring locations, pumps and other equipment needed, removal of liners, and labor to operate and monitor the detoxification process. Costs associated with removal of the ore are found in the Earthwork section of the estimate.				
DETOXIFICATION	\$150,000	LUMP SUM		\$150,000
SUBTOTAL DETOXIFICATION				\$150,000
EARTHWORK				
Earthwork includes the costs associated with the relocation of the leached ore to pits for disposal, covering the ore with two feet suitable cover material and one foot of soil material. Waste material and unleached ore is to be covered with one foot of soil material. All areas are to be regraded to maintain fill slopes at 3:1 and to re-establish drainage throughout the permit area.				
HAULING, REGRADING, COVER AND SOIL PLACEMENT				
21 YD3 SCRAPER, MEANS 022 246 2000	\$2.46	/YD3	1500' average haul	
FILL, MEANS 022 262 0010	\$1.40	/YD3	Spread dumped material by dozer, no compaction	
200HP DOZER, MEANS 029 204 2160	\$829.82	/AC	Rough grade and scarify	
PLANT AREA				
Rough Grade and Scarify	18.1	AC	\$829.82	\$15,020
PIT NO. 1				
Total Pit Area	25.0	AC		
Area of pit filled by leached ore	12.5	AC		
Cover (Cap) exposed ore, w/2 feet material using scrapers	40,300	YD3	\$2.46	\$99,138
Soil exposed ore, w/1 foot material using scrapers	20,150	YD3	\$2.46	\$49,569
Rough Grade and Scarify remaining areas	12.5	AC	\$829.82	\$10,373
PIT NO. 2				
Total Pit Area	21.2	AC		
Area of pit filled by leached ore	10.0	AC		
Cover (Cap) exposed ore, w/2 feet material using scrapers	32,300	YD3	\$2.46	\$79,458
Soil exposed ore, w/1 foot material using scrapers	16,100	YD3	\$2.46	\$39,606
Rough Grade and Scarify remaining areas	11.2	AC	\$829.82	\$9,294

Determination of Surety Amount			Last Revised	Sep 11, 1997
Drum Mine		M/023/007	Juab County	Utah
ACTIVITY	QUANTITY	UNITS	COST/UNIT	AMOUNT
WD-1				
Rough Grade and Scarify	28.1	AC	\$829.82	\$23,318
Soil waste dump, w/1 foot material using dozer	45300	YD3	\$1.40	\$63,420
WD-2				
Rough Grade and Scarify	14.4	AC	\$829.82	\$11,949
Soil waste dump, w/1 foot material using dozer	23200	YD3	\$1.40	\$32,480
WD-3				
Rough Grade and Scarify	7.2	AC	\$829.82	\$5,975
Soil waste dump, w/1 foot material using dozer	11600	YD3	\$1.40	\$16,240
WD-4 (Covered by HG-7)				
WD-5				
Rough Grade and Scarify	13.4	AC	\$829.82	\$11,120
Soil waste dump, w/1 foot material using dozer	21600	YD3	\$1.40	\$30,240
HG-1				
Haul leached ore to pit areas using scrapers	311000	YD3	\$2.46	\$765,060
Rough Grade and Scarify	14.0	AC	\$829.82	\$11,617
Soil waste dump, w/1 foot material using dozer	22600	YD3	\$1.40	\$31,640
HG-2				
Haul leached ore to pit areas using scrapers	213000	YD3	\$2.46	\$523,980
Rough Grade and Scarify	11.7	AC	\$829.82	\$9,709
Soil waste dump, w/1 foot material using dozer	18900	YD3	\$1.40	\$26,460
HG-3				
Haul leached ore to pit areas using scrapers	198000	YD3	\$2.46	\$487,080
Rough Grade and Scarify	8.2	AC	\$829.82	\$6,805
Soil waste dump, w/1 foot material using dozer	13,200	YD3	\$1.40	\$18,480
HG-4				
Haul leached ore to pit areas using scrapers	241,000	YD3	\$2.46	\$592,860
Rough Grade and Scarify	6.6	AC	\$829.82	\$5,477
Soil waste dump, w/1 foot material using dozer	10,600	YD3	\$1.40	\$14,840
HG-5				
Haul leached ore to pit areas using scrapers	232,000	YD3	\$2.46	\$570,720

Determination of Surety Amount			Last Revised	Sep 11, 1997
Drum Mine		M/023/007	Juab County	Utah
ACTIVITY	QUANTITY	UNITS	COST/UNIT	AMOUNT
Rough Grade and Scarify	10.9	AC	\$829.82	\$9,045
Soil waste dump, w/1 foot material using dozer	17,600	YD3	\$1.40	\$24,640
HG-6				
Haul leached ore to pit areas using scrapers	98,000	YD3	\$2.46	\$241,080
Rough Grade and Scarify	4.7	AC	\$829.82	\$3,900
Soil waste dump, w/1 foot material using dozer	7,600	YD3	\$1.40	\$10,640
HG-7				
Haul leached ore to pit areas using scrapers	262,000	YD3	\$2.46	\$644,520
Rough Grade and Scarify	10.7	AC	\$829.82	\$8,879
Soil waste dump, w/1 foot material using dozer	17,300	YD3	\$1.40	\$24,220
LG-1				
Rough Grade and Scarify	4.3	AC	\$829.82	\$3,568
Soil waste dump, w/1 foot material using dozer	6,900	YD3	\$1.40	\$9,660
LG-2				
Haul leached ore to pit areas using scrapers	298,000	YD3	\$2.46	\$733,080
Rough Grade and Scarify	17.8	AC	\$829.82	\$14,771
Soil waste dump, w/1 foot material using dozer	28,700	YD3	\$1.40	\$40,180
LG-3				
Haul leached ore to pit areas using scrapers	363,000	YD3	\$2.46	\$892,980
Rough Grade and Scarify	10.0	AC	\$829.82	\$8,298
Soil waste dump, w/1 foot material using dozer	16,100	YD3	\$1.40	\$22,540
ROADS AND OTHER AREAS				
Rough Grade and Scarify	23.7	AC	\$829.82	\$19,667
PROPOSED BORROW AREA				
Rough Grade and Scarify	23.0	AC	\$829.82	\$19,086
SUBTOTAL EARTHWORK				\$6,292,682
DEMOLITION AND REMOVAL				
Demolition and removal of Plant Area structures, pumps, piping, etc. Disposal of demolition debris, trash, pond and heap liners, and other waste materials to an approved landfill. Salvage value of equipment or materials is not considered as part of the bond amount required.				
DEMOLITION AND REMOVAL	\$30,000	LUMP SUM		\$30,000
SUBTOTAL DEMOLITION AND REMOVAL				\$30,000

Determination of Surety Amount			Last Revised	Sep 11, 1997
Drum Mine		M/023/007	Juab County	Utah
ACTIVITY	QUANTITY	UNITS	COST/UNIT	AMOUNT
REVEGETATION				
Seed/Fertilize MEANS 029 308 5700	\$577.17	AC		
Fertilizer and Seed	270	AC	\$577.17	\$155,836
SUBTOTAL REVEGETATION				\$155,836
CONSTRUCTION SUPERVISION				
Foreman, Outside MEANS Skwk	\$45.45	/HR		
80 weeks supervision @ 40 hours/week	3,200	HRS	\$45.45	\$145,440
SUBTOTAL CONSTRUCTION SUPERVISION				\$145,440
SUBTOTAL				\$6,773,958
ENGINEERING AND CONTINGENCY, @ 10%				\$677,400
SUBTOTAL				\$7,451,358
ESCALATION, @ 2.52% PER YEAR, FOR FOUR YEARS (2002\$)				\$780,000
TOTAL BOND AMOUNT, SCENARIO A (ROUNDED TO THE NEAREST \$1,000)				\$8,231,000

Determination of Surety Amount			Last Revised	Sep 11, 1997
Drum Mine		M/023/007	Juab County	Utah
ACTIVITY	QUANTITY	UNITS	COST/UNIT	AMOUNT
SCENARIO B - Regrading and capping of all leached heaps in existing locations.				
DETOXIFICATION				
Detoxification assumes flushing of the heap areas with water to neutralize cyanide is not a viable option due the current restrictions on the leach pad operation. In order to eliminate contaminated water perched within and under the leach pad facilities, the ore will be drilled or trenched down to the pad liners to locate perched water. Any water encountered in the process will be decanted from heaps or otherwise neutralized or disposed of by treatments necessary and approved by DEQ in developing a mitigation plan for detoxification of the leach pads. Costs include evaluation of the heaps, drilling/trenching, sampling costs, installation of monitoring locations, extending pad liners, pumps and other equipment needed, and labor to operate and monitor the detoxification process.				
DETOXIFICATION	\$350,000	LUMP SUM		\$350,000
SUBTOTAL DETOXIFICATION				\$350,000
EARTHWORK				
Earthwork includes the costs associated with the regrading of the leached ore heaps, covering the ore with two feet suitable cover material and one foot of soil material. Waste material and unleached ore is to be regraded and covered with one foot of soil material. All areas are to be regraded to maintain fill slopes at 3:1 and to re-establish drainage throughout the permit area.				
HAULING, REGRADING, COVER AND SOIL PLACEMENT				
21 YD3 SCRAPER, MEANS 022 246 2000	\$2.46	/YD3	1500 ft average haul	
FILL, MEANS 022 262 0010	\$1.40	/YD3	Spread dumped material by dozer, no compaction	
200HP DOZER, MEANS 029 204 2160	\$829.82	/AC	Rough grade and scarify	
Plant Area				
Rough Grade and Scarify	18.1	AC	\$829.82	\$15,020
Pit No. 1				
Total Pit Area	25.0	AC		
Area of pit filled by leached ore	12.5	AC		
Cover (Cap) exposed ore, w/2 feet material using scrapers	40,300	YD3	\$2.46	\$99,138
Soil exposed ore, w/1 foot material using scrapers	20,150	YD3	\$2.46	\$49,569
Rough Grade and Scarify remaining areas	12.5	AC	\$829.82	\$10,373
Pit No. 2				
Total Pit Area	21.2	AC		
Area of pit filled by leached ore	8.0	AC		
Cover (Cap) exposed ore, w/2 feet material using scrapers	25,800	YD3	\$2.46	\$63,468
Soil exposed ore, w/1 foot material using scrapers	12,900	YD3	\$2.46	\$31,734
Rough Grade and Scarify remaining areas	13.2	AC	\$829.82	\$10,954

Determination of Surety Amount			Last Revised	Sep 11, 1997
Drum Mine		M/023/007	Juab County	Utah
ACTIVITY	QUANTITY	UNITS	COST/UNIT	AMOUNT
WD-1				
Rough Grade and Scarify	28.1	AC	\$829.82	\$23,318
Soil waste dump, w/1 foot material using dozer	45,300	YD3	\$1.40	\$63,420
WD-2				
Rough Grade and Scarify	14.4	AC	\$829.82	\$11,949
Soil waste dump, w/1 foot material using dozer	23,200	YD3	\$1.40	\$32,480
WD-3				
Rough Grade and Scarify	7.2	AC	\$829.82	\$5,975
Soil waste dump, w/1 foot material using dozer	11,600	YD3	\$1.40	\$16,240
WD-4 (Covered by HG-7)				
WD-5				
Rough Grade and Scarify	13.4	AC	\$829.82	\$11,120
Soil waste dump, w/1 foot material using dozer	21,600	YD3	\$1.40	\$30,240
HG-1				
Rough Grade and Scarify	14.0	AC	\$829.82	\$11,617
Cover (Cap) Heap w/2 feet using scrapers	45,200	YD3	\$2.46	\$111,192
Soil waste dump, w/1 foot material using dozer	22,600	YD3	\$1.40	\$31,640
HG-2				
Rough Grade and Scarify	11.7	AC	\$829.82	\$9,709
Cover (Cap) Heap w/2 feet using scrapers	37,800	YD3	\$2.46	\$92,988
Soil waste dump, w/1 foot material using dozer	18,900	YD3	\$1.40	\$26,460
HG-3				
Rough Grade and Scarify	8.2	AC	\$829.82	\$6,805
Cover (Cap) Heap w/2 feet using scrapers	26,500	YD3	\$2.46	\$65,190
Soil waste dump, w/1 foot material using dozer	13,200	YD3	\$1.40	\$18,480
HG-4				
Rough Grade and Scarify	6.6	AC	\$829.82	\$5,477
Cover (Cap) Heap w/2 feet using scrapers	21,300	YD3	\$2.46	\$52,398
Soil waste dump, w/1 foot material using dozer	10,600	YD3	\$1.40	\$14,840
HG-5				
Rough Grade and Scarify	10.9	AC	\$829.82	\$9,045

Determination of Surety Amount			Last Revised	Sep 11, 1997
Drum Mine		M/023/007	Juab County	Utah
ACTIVITY	QUANTITY	UNITS	COST/UNIT	AMOUNT
Cover (Cap) Heap w/2 feet using scrapers	35,200	YD3	\$2.46	\$86,592
Soil waste dump, w/1 foot material using dozer	17,600	YD3	\$1.40	\$24,640
HG-6				
Rough Grade and Scarify	4.7	AC	\$829.82	\$3,900
Cover (Cap) Heap w/2 feet using scrapers	15,200	YD3	\$2.46	\$37,392
Soil waste dump, w/1 foot material using dozer	7,600	YD3	\$1.40	\$10,640
HG-7				
Rough Grade and Scarify	10.7	AC	\$829.82	\$8,879
Cover (Cap) Heap w/2 feet using scrapers	34,500	YD3	\$2.46	\$84,870
Soil waste dump, w/1 foot material using dozer	17,300	YD3	\$1.40	\$24,220
LG-1				
Rough Grade and Scarify	4.3	AC	\$829.82	\$3,568
Soil waste dump, w/1 foot material using dozer	6,900	YD3	\$1.40	\$9,660
LG-2				
Rough Grade and Scarify	17.8	AC	\$829.82	\$14,771
Cover (Cap) Heap w/2 feet using scrapers	57,400	YD3	\$2.46	\$141,204
Soil waste dump, w/1 foot material using dozer	28,700	YD3	\$1.40	\$40,180
LG-3				
Rough Grade and Scarify	10.0	AC	\$829.82	\$8,298
Cover (Cap) Heap w/2 feet using scrapers	32,300	YD3	\$2.46	\$79,458
Soil waste dump, w/1 foot material using dozer	16,100	YD3	\$1.40	\$22,540
Roads and Other Areas				
Rough Grade and Scarify	23.7	AC	\$829.82	\$19,667
Proposed Borrow Area				
Rough Grade and Scarify	23.0	AC	\$829.82	\$19,086
SUBTOTAL EARTHWORK				\$1,570,404
DEMOLITION AND REMOVAL				
Demolition and removal of Plant Area structures, pumps, piping, etc. Disposal of demolition debris, pond and pad liners, trash and other waste materials to an approved landfill. Salvage value of equipment or materials is not considered as part of the bond amount required.				
DEMOLITION AND REMOVAL	\$30,000	LUMP SUM		\$30,000
SUBTOTAL DEMOLITION AND REMOVAL				\$30,000

Determination of Surety Amount			Last Revised	Sep 11, 1997
Drum Mine		M/023/007	Juab County	Utah
ACTIVITY	QUANTITY	UNITS	COST/UNIT	AMOUNT
REVEGETATION				
Seed/Fertilize MEANS 029 308 5700	\$577.17	AC		
Fertilizer and Seed	245	AC	\$577.17	\$141,407
SUBTOTAL REVEGETATION				\$141,407
CONSTRUCTION SUPERVISION				
Foreman, Outside MEANS Skwk	\$45.45	/HR		
60 weeks supervision @ 40 hours/week	2,400	HRS	\$45.45	\$109,080
SUBTOTAL CONSTRUCTION SUPERVISION				\$109,080
SUBTOTAL				\$2,200,891
ENGINEERING AND CONTINGENCY, @ 10%				\$220,100
SUBTOTAL				\$2,420,991
ESCALATION, @ 2.52% PER YEAR, FOR FOUR YEARS (2002\$)				\$253,400
TOTAL BOND AMOUNT, SCENARIO B (ROUNDED TO THE NEAREST \$1,000)				\$2,674,000

The bond amount determined in SCENARIO B is recommended in as much as both scenarios rely on assumptions regarding the disposition of the heaps which cannot be resolved until such time as analysis and evaluation of the existing heaps occur. A reclamation plan must be submitted to the Division which reflects reclamation treatments based on the above that can successfully demonstrate that reclamation can be accomplished. Once a revised plan is submitted and approved, the bond amount required can be adjusted as necessary to reflect such changes.

Determination of Bond Liability for Each Operator

Reclamation treatments and costs were applied for the entire site in the above cost scenarios and were not segregated between the two operators. In order to determine the bond liability for each operator, several considerations were evaluated. First, would be to increase the bond on a pro-rata share based on the bond amount at the time of partial permit transfer. This alternative however, because those costs were based on conditions which currently do not exist, appears arbitrary.

Since the acreages used in the above estimation also vary from those indicated in the

partial permit transfer document, adjusting the bond in proportion to the acreages in the partial permit transfer also appears inappropriate.

Utilizing the intent of the partial permit transfer in that JUMBO was indicated as being responsible for heaps HG-1, HG-2, HG-3 HG-4, and HG-5, while WSMC would retain liability for heaps HG-6, LG-1, LG-2, and LG-3. The area of the toe for each heap was calculated and is shown in the estimated heap volume calculations in the above table. Based on these areas, JUMBO accounts for 31.7 acres in heap area and WSMC accounts for 27.1 acres in heap area as they currently exists on the site. In terms of volume, JUMBO's heaps contained an estimated 1,195,000 cubic yards of ore and WSMC's heaps contained an estimated 1,074,000 cubic yards.

JUMBO's intended responsibility for the other areas included Pit 1, Pit 2, the Plant Area, Roads and other miscellaneous disturbed areas. WSMC's responsibility included the waste dumps, WD-1, WD-2, WD-3 and WD-5. For these areas as delineated during this evaluation, JUMBO accounts for about 88 acres and WSMC accounts for 63.1 acres. Neither plan discusses the possibility of the borrow area that was incorporated into the site which had an estimated additional 23 acres. Utilization of the borrow area, the roads, ramps, waste dumps and other inholdings within the delineated disturbed areas are commingled during reclamation evaluating based on these areas seems inappropriate at this time.

Because much of the controversy and costs incorporated into the cost estimate involve detoxification, regrading and reclamation of the heaps, and, that the amount of ore retained in the heaps for each operator is essentially equal, it follows that, until such time as the plans are revised, that both operators should assume equal responsibility in terms of the bond amount required.

Accordingly, the Division finds that each operator should increase their respective bond amount \$1, 337,000.00 and that the aggregate amount of bond for the entire site is \$2,674,000.00.